REMARKS

Applicant thanks the Examiner for the first complete examination of the instant application. Claims 1-43 are currently pending in the instant application. Claims 1, 3, 6, 9 and 33 have been amended by way of this Amendment. Claims 1, 9, and 33 are independent. Reconsideration of this application, as amended, is respectfully requested.

Specification Objection

The Examiner maintains that various phraseology, added to the specification in the Amendment filed September 4, 2001, raise a new matter concern. By way of this Amendment, Applicant has removed the phraseology objected to by the Examiner. Therefore, the Applicant respectfully submits that the specification objection has been obviated.

Although the Applicant has removed the phraseology objected to by the Examiner, the Applicant would like to point out that the disclosure of the instant specification must be continued to be afforded a broad interpretation. In particular, the Applicant does not acquiesce in any way that the Examiner's specification objection is proper. Instead, the phraseology has been removed from the specification in order to further expedite the prosecution of the instant application.

Claim Rejections Under 35 U.S.C. § 112

Claims 1-43 stand rejected under 35 U.S.C. § 112, first paragraph, as continuing subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. This rejection is respectfully traversed.

Both independent claim 1 and dependent claim 6 have been amended by way of this Amendment. The claim amendments remove the specific terminology that the Examiner is concerned with.

Similar to the above-discussed specification objection, Applicant respectfully submits that the deletion of the subject matter from the claims should not be construed that the Applicant agrees with the Examiner's position stated in the rejection. Instead, Applicant has removed the subject matter of particular concern to the Examiner in order to further the prosecution of the instant application.

In view of the above, Applicant respectfully requests reconsideration and withdrawal of the claim rejection under 35 U.S.C. § 112, first paragraph.

Claims 1-43 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

With regard to the subject matter of independent claim 1, Applicant has amended the claim language to set forth that the minimum temperature is "higher than room temperature." Applicant respectfully submits that this amended language of independent claim 1 is in complete conformance with 35 U.S.C. § 112, second paragraph.

With regard to various other claims pending in the instant application, the Examiner maintains the phraseology "vacuum-tight manner" is vague and indefinite. The Applicant does not understand how the Examiner has come to this conclusion. That is, as the Examiner is

undoubtedly aware, the term vacuum in relation to the instant claimed invention relates to an environment which is substantially the devoid of matter. Moreover, as the Examiner is aware tight is generally referred to something that is firmly or closely fixed in place. Therefore, when the claims of the instant application mention a "vacuum-tight connection," one of ordinary skill in the art would clearly understand that the defined connection represents a connection in which matter such as air cannot breach. The Examiner is therefore respectfully requested to clarify his lack of understanding associated with the phraseology "vacuum-tight manner."

In view of the amendments to the claims and the above comments, Applicant respectfully requests reconsideration and withdrawal of the claimed rejection under 35 U.S.C. § 112, second paragraph.

Claim Rejection Under 35 U.S.C. § 103

Claims 1-43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Olson et al., (U.S. Patent No. 4,933,239) or Rose et al., (U.S. Patent No. 5,482,578). These rejections are respectfully traversed.

It is noted that the Examiner has not combined the two relied upon patent documents. Instead, the Examiner has relied upon Olson et al. and Rose et al. individually.

Independent claim 1 sets forth a combination of limitations including specific processes that take place while in a vacuum. Referring to independent claim 1, the heating process, the applying process and the subjecting process all take place while in a vacuum. Similarly, independent claims 9 and 33 set forth elements that are maintained in a vacuum. The Examiner

is respectfully requested to further the specific recitations of the various independent claims if clarification of the subject matter thereof is required.

Olson et al. teach a two-step coating process. In particular, Olson et al teach applying an overlay coating to a specimen using a plasma sprayed powder. According to the relied upon patent, the plasma spray operation is preferably in a vacuum or a low pressure environment. (See Col. 7, lines 16-18.) After the overlay coating is applied to the specimen, it is glass bead peened at a specific intensity level. However this glass bead peening process is necessarily outside of a vacuum.

In particular, as those of ordinary skill in the art are aware, glass bead peening is done in an environment that includes air. Therefore, it is impossible to glean from the relied upon patent document that the glass bead peening process is done in a vacuum.

Because the two-step process according to Olson et al. is not done completely in a vacuum, the patent document may not be relied upon by the Examiner to teach or suggest each of the limitations of independent claims.

The relied upon Rose et al. document will not be discussed. The Examiner readily admits that Rose et al. fail to teach or suggest a coating process that includes various steps that occur while in a vacuum. For this reason alone, Rose et al. may not be relied upon by the Examiner to teach or suggest that which is set forth in the independent claims of the instant application.

However, Rose et al. has further deficiencies in addition to the vacuum deficiency. According to Rose et al., turbine blade work pieces are platinum plated in a bath containing platinum coating material. After the coating process, the turbine blade is heated to a temperature of approximately 1,900° F. (See Col. 4, lines 30-40.)

Therefore, unlike the instant claimed invention, the turbine blade according to Rose et al. is first coated and then heated. This is distinctly different from the method and apparatus according to instant claimed invention, where a turbine blade is first heated and then coated.

In summary, neither of the patent documents relied upon by the Examiner teach or suggest an apparatus or method that uses a vacuum environment to heat, coat and/or postheat a turbine blade.

With regard to the rejected dependent claims, Applicant respectfully submits that these claims are at least allowable due to their dependence upon allowable independent claim.

In accordance with the above, Applicant respectfully requests reconsideration and withdrawal of the claim rejections under 35 U.S.C. § 103(a).

Conclusion

Accordingly, in view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of claims 1-43 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Timothy R. Wyckoff, Reg. No. 46,175 at the telephone number of the undersigned below.

In the event this Response does not place the present application in condition for allowance, applicant requests the Examiner to contact the undersigned at (703) 668-8000 to schedule a personal interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By ______________________

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ATTACHMENT FOR SPECIFICATION AMENDMENTS

On page 1, paragraph 2, please replace as follows:

B2

[0002] The invention relates to a method of coating a product with a metallic coating, in particular with a metallic anti-oxidation coating, in a vacuum plant. In the method, the product is ~~preferably~~ fed into the vacuum plant and heated from room temperature to a product temperature, the metallic coating is applied to the product, and the coated product is subjected to a postheat treatment. Furthermore, the invention relates to an apparatus for coating a product with a metallic coating in a vacuum plant, the vacuum plant including a coating chamber and a postheat treatment chamber.

On pages 2-3, paragraph 7, please replace as follows:

B3

[0007] According to the invention, the first-mentioned object is achieved by a method of coating a product with a metallic coating, in particular with a metallic anti-oxidation coating, in a vacuum plant. In this method, the product is fed into the vacuum plant and heated from room temperature to a product temperature; the metallic coating is applied to the product; and the coated product is subjected to a postheat treatment. The postheat treatment ~~preferably~~ follows the application of the coating in such a way that the temperature of the product after the application of the coating and before the postheat treatment is at least as high as a minimum temperature, the minimum temperature being relatively higher than room temperature.

On page 4, paragraph 14, please replace as follows:

[0014] The method ~~preferably~~ operates on a product that is always close to a state of thermodynamic equilibrium with its surroundings. Time-dependent and spatial temperature gradients, in particular thermal shocks, are ~~preferably~~ avoided. By this novel method in the process control with regard to the temperature profile, it is possible to markedly improve the bonding of the metallic coating to the parent material of the product in the postheat treatment. In the postheat treatment following the application of the metallic coating in this manner, a firm connection between parent material and coating material is produced by diffusion actions, and a coating of high quality is formed on the product.

B4

On pages 12-14, paragraphs 43-45, please replace as follows:

[0043] The coating chamber 3 has a coating region 9 in which a coating device 14 and a holder 16, rotatable about a longitudinal axis 17, for gas turbine blades 12 are arranged. In this ~~exemplary~~ case, the coating device 14 is ~~preferably~~ designed as a VPS (Vacuum Plasma Spraying) or LPPS (Low Pressure Plasma Spraying) device (plasma torch) for the thermal spraying of coating material 15 - for example MCrAIX - onto a gas turbine blade 12. The coating device 14 at the same time serves to heat the gas turbine blade 12 to a predetermined product temperature. This is ensured during a coating operation by the hot process gases of the coating device 14 (plasma torch) and by the coating material 15 striking the gas turbine blade 12.

B5

[0044] A gas turbine blade 12 is located in the coating region 9 on the holder 16. The coating device 14 is arranged above the gas turbine blade 12 in the coating region 9. Formed in the postheat treatment chamber 5 is a postheat treatment region 10, in which a number of coated gas turbine blades 12 having a metallic coating 13, ~~preferably~~ <u>in particular</u> an MCrAIX coating,

are located on the transport device 8. In this case, the number of gas turbine blades 12 in the postheat treatment region 10 is greater than the number of gas turbine blades 12 in the coating region 9.

[0045] Two heating devices 7A are provided in the postheat treatment region 10. One heating device 7A is arranged above and the other heating device 7A is arranged below the gas turbine blades 12, so that heating of the gas turbine blades 12 to a predetermined product temperature (which is ~~preferably~~ the postheat treatment temperature) is thereby ensured by heat radiation. The vacuum chambers 2, 3, 4, 5, 6 of the vacuum plant 1 are connected to a vacuum pump system (not shown in figure 1), which preferably consists of a diffusion pump, valves and vacuum measuring devices and also a backing pump, so that a respectively required vacuum can be set in the individual vacuum chambers 2, 3, 4, 5, 6.

[0046] In the coating method for coating a product 12, for example a gas turbine blade 12, with a metallic coating 13, ~~preferably~~ a metallic MCrAlX anti-oxidation coating, in a vacuum plant 1, a gas turbine blade 12 is first of all fed into the preheating chamber 2 and arranged on the transport device 8 of the transfer system 8, 11. The preheating chamber 2 serves to receive and preheat the gas turbine blade 12. With the heating device 7 provided in the preheating chamber 2, the gas turbine blade 12 is heated from room temperature to a product temperature which is the coating temperature.

On page 14, paragraph 49 through paragraph 50, please replace as follows:

[0049] In the coating chamber 3, during the coating operation, a metallic coating 13, for example an MCrAlX anti-oxidation coating, is applied to the gas turbine blade 12. The coating material 15 (MCrAlX), for example by thermal spraying with VPS or LPPS spraying methods, is applied to the surface of the gas turbine blade 12 moving about the longitudinal axis 17, in this ~~exemplary~~ case rotating about the longitudinal axis 17.

B6 cont'd

[0050] In this ~~exemplary~~ case, the process time for applying this coating 13 is about 30 min. During this period, the gas turbine blade 12 is held at a coating temperature of around 1100 K to about 1200 K by the process-related heat input into the gas turbine blade 12. In this exemplary case, the gas turbine blade 12 is heated by the hot process gases of the coating device 14 (plasma torch) and by the coating material 15 striking the gas turbine blade 12.

On page 14, paragraphs 52-53, please replace as follows:

B7

[0052] In the lock chamber 4, the gas turbine blade 12, by means of the heating device 7 arranged there, is held at a predetermined product temperature which is always higher than a minimum temperature. The minimum temperature in this ~~exemplary~~ case is ~~preferably~~ higher than room temperature and is preferably 500 K, in particular between about 900 K and ~~about~~ 1400 K.

[0053] After the transfer, the gas turbine blade 12 provided with a metallic coating 13 is subjected to a postheat treatment in the postheat treatment region 10, this postheat treatment taking place at a postheat treatment temperature of about 1200 K to ~~about~~ 1500 K. To this end, the gas turbine blade 12 is brought to the predetermined postheat treatment temperature by means of the heating devices 7A and is held at this postheat treatment temperature for a period of time. Here, the process time is, for example, 120 min (also see descriptions with respect to figure 2 and figure 3). As a result, firm bonding (diffusion bonding) between the metallic coating 13 and the parent material of the gas turbine blade 12 is produced.

On page 15-16, paragraph 56, please replace as follows:

B8

[0056] The method, just described by way of example for a product 12, in particular a gas turbine blade 12, for coating a product 12 with a metallic coating 13 is characterized by the

fact that it is conceived as a continuous and ~~nearly~~ simultaneous method. In this way, a plurality of products 12 can pass through various method steps ~~nearly~~ simultaneously and continuously. In figure l, this is illustrated by the fact that, for example, one gas turbine blade 12 is located in the coating region 9 and ~~nearly~~ simultaneously, a larger number of gas turbine blades 12 is in each case located in the preheating chamber 2, the lock chamber 4, the postheat treatment chamber 10 and the cooling chamber 6. A metallic coating 13 is therefore applied to gas turbine blades 12 in the coating region 9, while gas turbine blades 12 provided with a metallic coating 13 are ~~nearly~~ simultaneously subjected to a postheat treatment in the postheat treatment region 10; and at the same time gas turbine blades 12 are pretreated in the preheating chamber 2, and at the same time gas turbine blades 12 are cooled down in a controlled manner in the cooling chamber 6, and at the same time gas turbine blades 12 are transferred in the lock chamber 4. A continuous and ~~nearly~~ simultaneous pass of gas turbine blades 12 through the various method steps is possible.

B8

On page17-18, paragraphs 65-67, please replace as follows:

B9

[0065] With this temperature profile, the product 12 is first of all heated linearly from room temperature T_R to a product temperature T which is the coating temperature T_c. While the metallic coating 13 is being applied to the product 12, the temperature for the coating process time Δt_C is kept at the coating temperature T_c. For products 12 which constitute, for example, gas turbine blades which are ~~preferably~~ provided with an MCrAlX coating, the coating temperature T_c is ~~about~~ 1100 K to about 1200 K.

[0066] Directly after the actual coating operation, the product 12 is transferred continuously from the coating region 9 into the postheat treatment region 10 through the lock chamber 4, which, as illustrated, is possibly associated with a change in the temperature of the product 12, generally with a decrease in the temperature. The temperature profile in this method step is constructed in such a way that the possible temperature decrease of the product 12 from the coating temperature T_H to a minimum temperature T_{min} is restricted, this minimum

temperature T_{min} being higher than room temperature T_R. In gas turbine blades, the minimum temperature T_{min} in this case is preferably higher than ~~about~~ 500 K, in particular between about 900 K and ~~about~~ 1400 K.

B9

[0067] The product 12, for the postheat treatment, is then heated to a product temperature T which is the postheat treatment temperature T_H and which, for example for gas turbine blades, is around 1200 K to ~~about~~ 1500 K. The postheat treatment takes place at the postheat treatment temperature T_H, at which the product 12 is held for a postheat treatment process time Δt_H is greater than the coating process time Δt_C.